[1] Work done with the aid of grants from the University of Wisconsin Research Fund and the Wisconsin Alumni Research Foundation. At various periods during the progress of this study, assistance has been rendered by Ineva F. Reilly, Dorothy C. Bauch, Margaret B. Siler and Fred W. Tinney. Most of the cytological preparations were made by Donald W. Chamberlain under a CWA appointment.

[2] Allen, C. E., "The Occurrence of Polyploidy in Sphaerocarpos," *Amer. Jour. Bot.* (in press).

A SECOND EOCENE PRIMATE FROM CALIFORNIA

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Read before the Academy, Wednesday, November 22, 1933

Introduction.—In several papers, published in the PROCEEDINGS,[1] I have described some of the very late Eocene mammals obtained by the California Institute at Locality 150 in the Sespe deposits of southern California. Among the forms recently recorded[2] is the tarsiid, *Chumashius balchi*, related to the genera *Omomys* and *Hemiacodon*. The present paper deals with a second primate, evidently related to and presumably derived from the Bridger genus *Washakius*. This type and associated mammals were found at Locality 180, stratigraphically lower in the Sespe deposits than Locality 150. The faunal stage represented here is clearly earlier than that now being recorded from the latter locality, and is presumably upper Eocene in age. In view of the interest which attaches to fossil members of the primate group in North America, the new type is described in advance of a fuller statement of the occurrence of this older Eocene fauna in the Sespe, north of the Simi Valley.

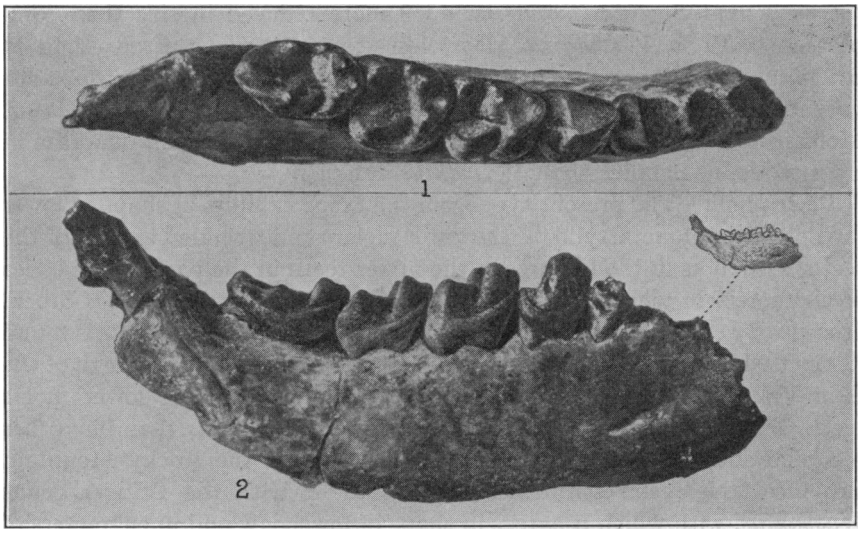
Dyseolemur pacificus, n. gen. and n. sp.

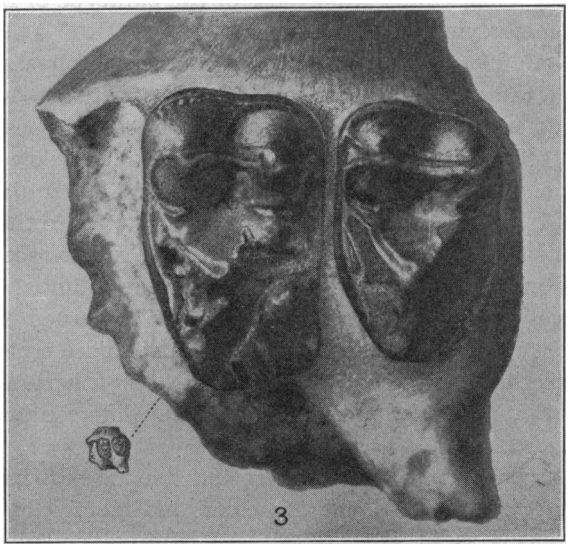
Type Specimen.—No. 1395 Calif. Inst. Tech. Vert. Pale. Coll., a fragmentary right ramus with cheek-tooth series $P\bar{4}$-$M\bar{3}$ complete, a small portion of $P\bar{3}$ and alveoli for $P\bar{2}$, C, and one or two incisors, plate 1, figures 1 and 2.

Paratype.—No. 1528, a maxillary fragment with $M\underline{2}$ and $M\underline{3}$, plate 1, figure 3.

Referred Specimens.—Several fragmentary rami with cheek-teeth, Nos. 1529, 1530 and 1531.

Locality.—Tapo Ranch, Locality 180 Calif. Inst. Tech. Vert. Pale., approximately 3 miles east of Locality 150 and approximately 700 feet lower in the Sespe deposits, north of the Simi Valley, Ventura County, California. Upper Eocene.





EXPLANATION OF PLATE

Dyseolemur pacificus, n. gen. and n. sp.

Figures 1 and 2, type specimen, No. 1395, occlusal and lateral views; × 6.

Figure 3, paratype, No. 1528, occlusal view; approximately × 10. Smaller figures represent specimens in natural size.

California Institute of Technology Collections. Sespe Upper Eocene, California.

Generic and Specific Characters.—$M\bar{3}$ more reduced in size than comparable tooth in *Washakius*. Heel less expanded transversely than in Bridger genus. Posterior portion of heel does not form a distinct lobe nor does it possess two distinct cusps (double hypoconulid) as in *Washakius*. Molars with small metastylids. $P\bar{4}$ subtriangular rather than quadrate in cross-section. Smaller than *Washakius insignis*.

Description.—The present type from the Sespe exhibits in shape of lower jaw, presence of metastylid on the lower molars and wrinkled enamel of the teeth, as well as in the features of the upper teeth in the paratype, a series of characters in which it differs decidedly from *Chumashius balchi* Stock. It is clearly evident also from the field occurrence that *Dyseolemur* is found distinctly lower than *Chumashius* in the Sespe beds, as exposed north of the Simi Valley, California. In presence of metastylid in the lower molar teeth, *Dyseolemur* is more like *Washakius* and *Shoshonius* than like other recorded anaptomorphs from the Eocene basins of the Rocky Mountain Province. Nearest resemblance appears to be with the Bridger genus *Washakius*, with which it agrees in shape of lower jaw and in characters of the lower and upper dentition. *Shoshonius* is a distinctly earlier form, in which the upper molars differ from those of the paratype of *Dyseolemur* in presence of a mesostyle.

The jaw, No. 1395, deepens noticeably in the symphyseal region. A small mental foramen is situated beneath the anterior root of $P\bar{4}$. In front of this and separated from it by a bar of bone is an open canal which leads forward. The groove may lead into the foramen below the bar. In the type specimen the lower teeth anterior to $P\bar{4}$ are either absent or, as in the instance of $P\bar{3}$, but imperfectly preserved. Anterior to the alveolus for the third premolar can be seen the socket for the single-rooted $P\bar{2}$. Immediately in front of this is a larger alveolus for the canine. Remnants of the alveolar walls of at least one incisor can be discerned apparently in front of the socket for the canine. All of the alveoli are crowded. Thus, in number of teeth, behind the last incisor, *Dyseolemur* agrees with *Washakius*, *Chumashius*, *Hemiacodon* and *Omomys* and differs from *Anaptomorphus* and *Tetonius*.

$P\bar{4}$ possesses a basal cross-section of crown, which is subtriangular rather than quadrate. In this tooth the paraconid and metaconid do not form such distinct cusps as in *Washakius*. An external cingulum is clearly shown on the molars and fourth premolar, plate 1, figure 2. In the molars of *Dyseolemur* the metastylid is smaller than in comparable teeth of *Washakius*, although in some specimens of the latter genus the metastylid is relatively as small. The third lower molar is distinctly more reduced in size than in *Washakius*. The heel is less expanded transversely, with no tendency to form a well-defined posterior lobe as in the Bridger genus. The metastylid is small and the notch between it and the entoconid may be

acutely incised or may be open as in *Washakius*. In the Sespe type it is not a distinctly formed cusp as in *Washakius*, but, because of an expansion in a fore and aft direction, becomes crest-like. Posteriorly, the entoconid is connected by a ridge with the hypoconulid. In $M\bar{3}$ of the Bridger genus two distinct cusps (double hypoconulid) are present, whereas in our form only a single cusp is situated at the posterior end of the occlusal surface. A small ridge runs outward and then forward from the hypoconulid, meeting a ridge which extends backward from the hypocone. The difference between *Dyseolemur* and *Washakius* in the region of the talonid of $M\bar{3}$ is seen not only in the type, No. 1395, but also in the referred specimen, No. 1530. The trigonid portion of the crown in $M\bar{2}$ and $M\bar{3}$ of the Californian form is somewhat less compressed anteroposteriorly. The length (in millimeters), as measured from the anterior end of $P\bar{4}$ to the posterior end of $M\bar{3}$, in No. 1395 is 7.6. In a specimen of *Washakius insignis* (No. 13235–2 Yale Peabody Mus. Coll.) the comparable measurement is 9.1.

$M\underline{2}$ and $M\underline{3}$ are present in the paratype, No. 1528, plate 1, figure 3. The third molar is shorter transversely than $M\underline{2}$, but possesses practically the same anteroposterior diameter as in this tooth. These teeth are decidedly smaller than those of *Hemiacodon gracilis* (Nos. 12012, 12030 Amer. Mus. Nat. Hist. Coll.) from the Bridger. They are likewise smaller than the comparable teeth in *Washakius* (see measurements below). The cingulum is not so well developed in No. 1528 as in *Washakius insignis*. A mesostyle is absent. In $M\underline{2}$ the hypocone is situated posterior and slightly internal to the protocone, but does not have the cingular position seen in *Hemiacodon*. In the Californian specimen the summits of the protocone and hypocone are situated farther toward the outer side, with reference to the inner border, than in *Washakius insignis*. The intermediate cuspules are minute but discernible. $M\underline{3}$ is pointed internally. No hypocone is evident, but the postero-internal side of the tooth is abraded. A very small but distinct metaconule can be seen. In *Dyseolemur*, as in *Washakius*, the enamel of the upper molars is wrinkled, particularly, as noted by Wortman for the Bridger genus, that covering the inner portion of the crowns of these teeth. Of the two specimens of *Washakius*, figured by Wortman,[3] No. 1528 is more like No. 13235–4 Yale Peabody Mus. (Fig. 146) than like No. 13235–2 Yale Peabody Mus. (Fig. 145) in narrowness of $M\underline{2}$ and in the pointed inner end of $M\underline{3}$.

COMPARATIVE MEASUREMENTS (IN MILLIMETERS)

	NO. 1528 C.I.T. SESPE	NO. 13235–2 Y.P.M. BRIDGER	NO. 13235–4 Y.P.M. BRIDGER
Length, anterior end of $M\underline{2}$ to posterior end of $M\underline{3}$	3.7	4.2	4.1
$M\underline{2}$, transverse diameter	3.25	3.4	3.5
$M\underline{3}$, transverse diameter	2.8	3.1	3.15

[1] Stock, C., *Proc. Nat. Acad. Sci.*, **18**, 518–523 (1932); **19**, 434–440, 481–486, 762–767 (1933).

[2] Stock, C., *Ibid.*, **19**, 954–959 (1933).

[3] Wortman, J. L., *Am. Jour. Sci.*, ser. 4, **17**, 210, figures 145–146 (1904).

COINCIDENCE AND INTERFERENCE IN DROSOPHILA MELANOGASTER

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Communicated January 24, 1934

I. *Definitions.*—Crossing-over in any region of a chromosome decreases the crossovers in near-by regions. This fact, discovered early in the work with *Drosophila*[1] and interpreted consistently with the chiasmatype hypothesis,[2] was termed "interference."[3] The term "coincidence" was applied to the "ratio of observed double crossovers to the chance expectation." It is apparent that coincidence is an empiric measure of genetic data useful in predicting results of crosses, whereas interference refers to the interpretation of cytological events that may be inferred from the data.

II. *Analysis of Coincidence Data.*—The first extended analysis of coincidence data was made by Weinstein.[4] He found that coincidence of double crossovers for eosin-ruby was 1.0 with sable-forked, 0.9 with forked-fused and 0.7 with forked-cleft; i.e., there is a shortage of double crossover chromosomes for regions beyond sable-forked; (for distances nearer than eosin-ruby to sable-forked, coincidence was known to have shown progressively lower values, being zero for distances less than 15 map units to the right of eosin). This was interpreted to mean that the "section included between the two crossovers of a double tends to be of a particular length."[5] For the *X* chromosome, the modal length turned out to be about 46 map units. There are, however, two apparent objections to the experimental and analytical procedure here involved. (1) In all of the experiments cited above only four loci were used. There were, it turns out, numerous undetected double crossovers, and some singles were probably also undetected. The influence of these uncontrolled variables on the coincidence values was not known and could not have been predicted but can scarcely be disregarded. A further objection (2) can be urged, namely, the arbitrary analytical procedure of discarding the triple crossovers from his double crossover classes. His argument that another mechanism was involved is unsupported. Weinstein pointed out that no significant decline beyond 46 units is observed if his data are recalculated without omitting triples.